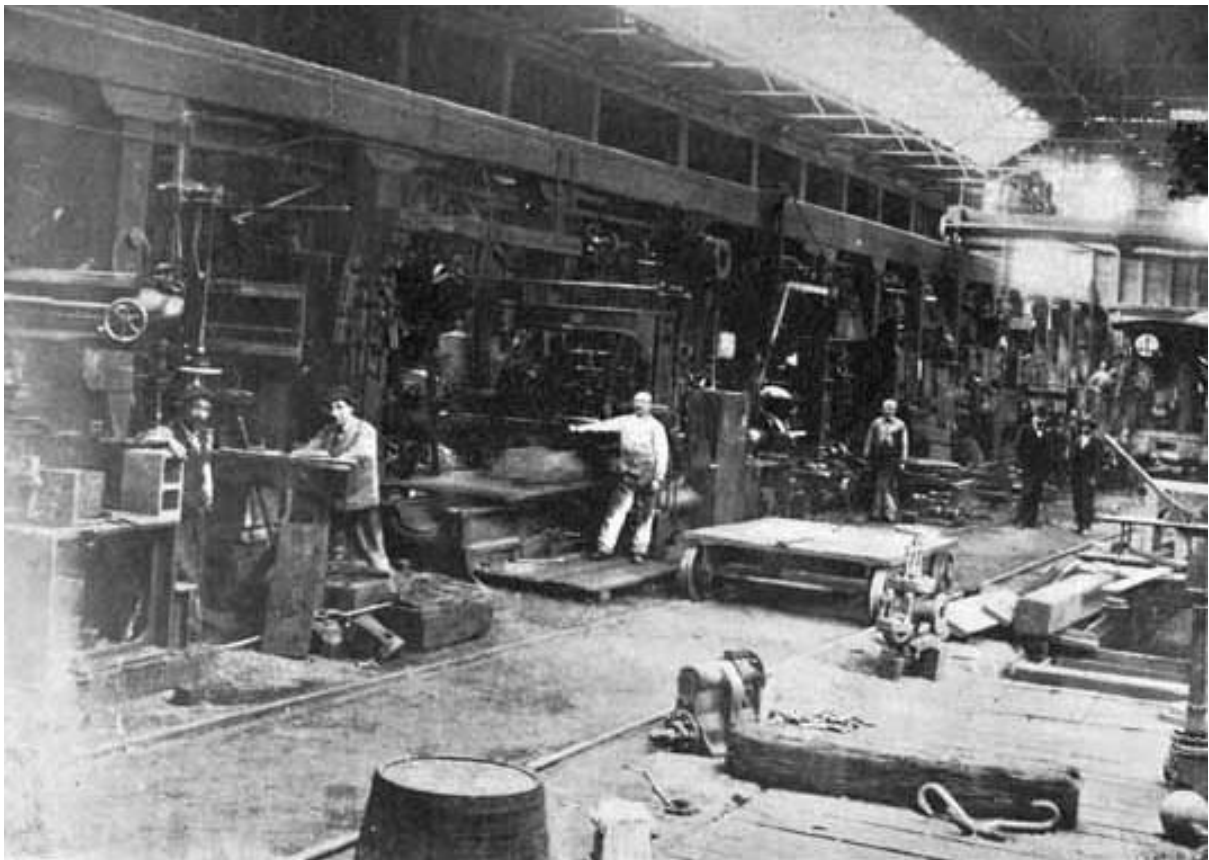**ENGINEERS**
AUSTRALIA

Engineering Heritage Victoria

Nomination of

PHOENIX FOUNDRY BALLARAT

for an award under the

Engineering Heritage Australia, Heritage Recognition Program

August 2013

Front Cover Photograph Caption

This image shows the machine shop of the Phoenix foundry. In the centre is a large planning machine of a type which would usually only be found in very large manufacturing concerns. To the left appears to be a large radial arm drilling machine.

Image: University of Ballarat Historical Collection, image number M6599

TABLE OF CONTENTS

<div align="right">**PAGE**</div>

1 Introduction

The Phoenix Foundry was a very significant manufacturing business during its 50 years of operation. It was one of reputedly 40 foundries in Ballarat during the heyday of manufacturing in Victoria in the 1880s. It was a larger business although there were other large foundries in the city including the nearly Union Foundry which is known to have produced a number of very large Cornish pumping engines including a Cornish Bill engine supplied to a New Zealand mine.

The unfortunate reality of recognition of the Phoenix Foundry is that nothing remains of the foundry itself. This circumstance faces nominators with the task of finding some alternative "link" between the subject site and remaining relics, or other reminders, of the subject site.

In this case the existence of the railway turntable pivot foundation, adjacent to the foundry site but within a public street, provides the opportunity for a link between the Phoenix Foundry and a remaining relic associated with it.

The location of the turntable pivot foundation in a public place provides an opportunity, subject to approval of the owner, the City of Ballarat, for the erection of an interpretation panel relating to the Phoenix Foundry. This nomination is based on this connection between the pivot foundation and the Phoenix Foundry. A suitable location for a standard EHA interpretation panel is possible adjacent to the pivot foundation.

2 Heritage Award Nomination Letter

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

Name of work: Phoenix Foundry

This work is nominated for an award under the Engineering Heritage Australia, Heritage Recognition Program.

Location, including address and map grid reference if a fixed work: The foundry was located in the block bounded by Armstrong Street South, Dana Street and Doveton Street South, Ballarat, Victoria. The remaining railway turntable pivot is located in Armstrong Street South about 50 metres north of Dana Street.

Grid Reference: 37°33'47"S, 143°51'19"E, elevation 442 metres.

Phoenix Foundry: The foundry has been completely removed. Now occupied by the Central Square Shopping Centre which covers the site completely. This site is not involved in the proposed heritage recognition.

Turntable Pivot: City of Ballarat, PO Box 655, Ballarat, Victoria 3353, owns the road and landscaped area where the turntable pivot is located.

The owner has been advised of this nomination and a letter of agreement is attached at Appendix 10.

Access to site: The turntable pivot is in a public area with no restrictions on access.

Nominating Body: Engineering Heritage Victoria.

OWEN PEAKE

Chair, Engineering Heritage Victoria

Date: 21 August 2013

3 Heritage Assessment

3.1 Item Name: Phoenix Foundry

3.2 Other/Former Names: Nil

3.3 Location: Ballarat, Victoria

3.4 Address: Armstrong Street South

3.5 Suburb/Nearest Town: Ballarat

3.6 State: Victoria

3.7 Local Govt. Area: City of Ballarat

3.8 Owner:

   Phoenix Foundry: Central Square Shopping Centre

   Turntable Pivot Foundation: City of Ballarat

3.9 Current Use:

   Phoenix Foundry: Shopping Centre

   Turntable Pivot Foundation: Remnant incorporated in public landscaped space.

3.10 Former Use:

   Phoenix Foundry: Engineering manufacturing facility

   Turntable Pivot Foundation: Carried a railway turntable to turn locomotives from the foundry to railway lines in Armstrong Street connecting the Victorian Railways system at Ballarat West.

3.11 Designer:

   Turntable Pivot Foundation: Phoenix Foundry

3.12 Maker/Builder:

   Turntable Pivot Foundation: Phoenix Foundry

3.13 Year Started:

   Phoenix Foundry: 1856

3.14 Year Closed:

   Phoenix Foundry: 1906

3.15 Physical Description:

Phoenix Foundry: The company was one of the larger foundries in Ballarat, employing at least 250 workers at times. Its main output was initially machinery for the mining industry but after the construction of locomotives started in 1871 there was an emphasis on this work with a total of (at least) 203 locomotives being built during the period 1873 to 1886.

The Phoenix Foundry
Image: University of Ballarat

Turntable Pivot Foundation: This was thought to be built in circa 1883 to connect the works to the railway for the purpose of delivering locomotives from the foundry to the Victorian Railways.

3.16 Physical Condition:

Phoenix Foundry: No parts of the foundry remain.

Turntable Pivot Foundation: The concrete foundation with 4 large attachment bolts appears to be in good condition.

3.17 Modifications and Dates:

Whilst it is known that considerable additions and changes were made to the facility during its life details of these changes are not known.

3.18 Historical Notes:

The company was founded in 1856 by Richard Carter, Robert Holden, George Threlfell and William Henry Shaw (manager) and commenced operations in 1857. The company concentrated on building products for the mining industry in the period 1857 to 1871 and thereafter concentrated on the construction of railway locomotives.

In 1861 there were 96 hands employed.

In 1869 there was a serious fire on the premises.

In 1870 the company became a limited liability company. At that time Shaw was the manager.

In 1871 the company won a contract for 10 locomotives. "The standard of work was so satisfactory that further contracts were given".[1]

On 4 March 1873 the first locomotive was completed.[2]

"The first locomotive constructed in Victoria has undergone the requisite trial, and to-day the event is to be celebrated in an appropriate manner at Ballarat. A banquet will be given by the Phoenix Foundry Company. A large party has been invited, and many members of Parliament are expected to be present. The Melbourne guests will leave town by special train at 8 a.m. They are to reach Ballarat at 11 o'clock, and the first business will be to inspect the premises of the foundry company. The banquet will take place at 2 o'clock, in the Town-hall. The special train leaves Ballarat for Melbourne, on the return journey, at 5 pm". [3]

The second locomotive engine for the Victorian Railways – an exact counterpart of the already famous No. 83 – has been placed on the rails by the contractors, the Phoenix Foundry Company.[4]

"A carpentry workshop was added in 1875 to enable the foundry to build Pullman carriages, with the help of subcontractors. But the government railway workshops were able to produce these more economically, and the Phoenix was forced to abandon this pursuit".[5]

---

[1] The Argus, Melbourne Victoria, 21 July 1871, page 6.
[2] William Bramwell Withers, The History of Ballarat from the First Pastoral Settlement to the Present Time, F W Niven & Co, Ballarat, 1887, page 293.
[3] *The Argus* (Melbourne, Vic. : 1848 - 1956), Wednesday 2 April 1873, pages 4-5. Digital copy accessed via Trove.
[4] *Gippsland Times* (Vic: 1861 - 1954), Saturday 10 May 1873, page 3. Digital copy accessed via Trove.
[5] Bates, Weston, Lucky City: The First Generation at Ballarat 1851-1901, Melbourne University Press, 1978, page 215.

The Railway Inquiry Board of 1877.[6]

In 1877 there was a Railway Board of Inquiry held into complaints about the quality of locomotives produced by Phoenix Foundry. A great deal of heat was generated however the report of the Inquiry was generally favourable to Phoenix Foundry.[7]

The Board of Inquiry was clearly established in such a way as to be favourable to the Victorian Railways management and in particular to Thomas Higginbotham, Engineer-in-Chief with the report being Directed to the Commissioner of Railways. There were three members all being the Colonial colleagues of the manager of the locomotive branch, William Meikle, General Overseer of Locomotives and Workshops for the Victorian Railways. They were William Scott, Locomotive Overseer, Sydney, NSW (Chair of the Board); Henry Horniblow, Locomotive Superintendent, S & W Railway of Queensland and William Thow, Locomotive Engineer, South Australian Railways.

There was vigorous debate involving at least *The Argus* newspaper (Melbourne), Mr Shaw, Manager of the Phoenix Foundry and the Victorian Railways. It was clear that there were two separate issues to be considered by the Board - the adequacy of the design of the locomotives in question and the quality of manufacture by the Phoenix Foundry.[8]

The engines apparently behaved strangely and were thought to be responsible for damage to the permanent way. The engines were designed by the Victorian Railways and the locomotives manufactured by the Phoenix Foundry were the first to be made to the design and the first to be manufactured to the drawings provided by the Victorian Railways.

Phoenix Foundry claimed that the design was faulty in some fundamental ways and that there were numerous errors in the drawings. It is also clear that the Victorian Railways were obstructive towards the attempts by Phoenix Foundry to rectify these problems. It can only be concluded that the objectives of the Victorian Railways, being to manufacture their own locomotives in-house, would be best served if the locomotives built by Phoenix Foundry were found to be flawed.

The Board concluded (briefly) that:

- The designs provided to the Phoenix Foundry were faulty with respect to the basic layout of the locomotives. An extract from the report states: "These points fixed, the question of arrangement presents itself, and it is in this respect we consider the design faulty".[9]
- Furthermore the following statement concludes that the locomotive design lacked essential stiffness in key areas - "Another important matter, which has been extremely insufficiently provided for, is the requisite rigidity and stiffness between the frames at the cylinders; and we consider that this grave error, with the others

---

[6] Ballarat and District Industrial Heritage Project, Ballarat University, Phoenix Foundry; General reference can be found at: http://bih.ballarat.edu.au/index.php/Phoenix_Foundry section relating to the Railway Inquiry Board of 1877 can be found at: http://bih.ballarat.edu.au/index.php/The_Railway_Inquiry_Board_of_1877

[7] This is the personal opinion of Owen Peake written on 16 August 2013 based on the extensive and complex reports referenced.

[8] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 6, dot points 1 & 2.

[9] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 16, line 3.

above-mentioned, are sufficient to account for the destructive action of these engines".[10]

- The Board found that materials used by Phoenix Foundry in the engines were generally of good quality although they were somewhat critical of the hardness of cylinder castings and some other brass components.[11]
- The Board found that some locomotives had experienced greater than expected repair, modification and component replacement however this was primarily caused by the "faulty and inefficient design", approved by the Victorian Railways and by the "incompetent supervision on behalf of the Government"[12] at the Phoenix Foundry.
- The Board found that there had been no complaints made by Victorian Railways staff during the manufacture of the engines and that no requests for changes had been made by Victorian Railways to the Phoenix Foundry although the Victorian Railways knew that there were defects in the engines.[13]
- The Board noted that in the case of the engines built by Phoenix Foundry from a "sample" locomotive purchased from a reputable British manufacturer and provided to Phoenix Foundry as a model, a much better result was achieved. In this case Phoenix Foundry was responsible for reverse-engineering the locomotive supplied and developing working drawings for use in the manufacturing process. These engines appeared to meet the Victorian Railways needs better than those designed in-house by the Victorian Railways although it was noted that the engines were still comparatively new.
- The Board was asked to assess if locally made locomotives were price-competitive with English-made locomotives. The Board seems to have struggled with this question. It suggested a likely cost of imported locomotives from the UK of GBP80 per ton including purchase, commission, freight to Australia and commissioning costs. Documents seen however do not allow comparison of this number with local purchase costs.

  One example gives in the reference quotes an imported cost of GBP3100 whilst a similar locomotive built in the colony cost GBP2050. This comparison demonstrates that the locally made locomotive is only two thirds of the cost of the same locomotive if it was imported. [14]

Whilst the Inquiry leaves many questions unanswered, it is apparent that things improved between the Victorian Railways and the Phoenix Foundry as foreshadowed in the report of the Railway Inquiry Board. Phoenix Foundry continued to manufacture locomotives for the Victorian Railways for another 28 years after the report, their work eventually being taken over by the Newport Railway Workshops.

In 1878, a model steam locomotive made by Phoenix Foundry apprentices was included in the Australian Juvenile Industrial Exhibition held in Ballarat. For further details of this model and the apprentices see Appendix 4.

---

[10] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 18, line 1.

[11] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 21, dot point 2.

[12] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 21, dot point 3.

[13] Refer reference XX above, under the heading "RAILWAY INQUIRY BOARD", paragraph 22.

[14] *The Argus* (Melbourne, Vic. : 1848 - 1956), Saturday 20 January 1877, page 5

"Much of the iron used to build the engines was obtained from the Lal Lal Iron Company".[15]

In 1881 the company made moves to relocate to a larger site but several applications to the Council were rebuffed.[16] By 1882 they had made the decision to remain on the present site and to rebuild. Furthermore "from 1882 the company stopped taking on other work to concentrate only on locomotive construction".[17]

New workshops and stores were built at this time:

- Materials and Pattern Store - 2 storey building 80 feet by 22 feet.
- Boiler Makers and Tender Shop - 137 feet by 26 feet.
- Pattern Makers Shop - 137 feet by 26 feet.
- Blacksmiths Shop - 94 feet by 83 feet.
- Fitting Shop - 332 feet by 38 feet. This shop ran right through the site from Armstrong Street to Doveton Street.[18]

"The Phoenix Foundry Company made application last evening (29 August 1882) to the City Council for permission to lay a tramway from the foundry to the railway station, and pointed out that it would expedite the delivery of the engines they were making, and save the streets from the effects of the heavy steam lorry passing over them. As it was intended only to use the way in the mornings it would not impede traffic at all. The mayor said he had already informed the applicants that the council had no power to grant the request, but he at the same time told them he thought they might lay it down at their own risk. The matter was referred to the Works Committee for report".[19]

On 13 April 1883 there was a public holiday in Ballarat to mark the completion of the one hundredth locomotive for the Victorian Government. A special railway line was laid between the foundry and the Ballarat West Railway Station from where the new locomotive engine steamed along Armstrong Street to the railway station.[20]

On 13 April 1883 a public holiday was celebrated in Ballarat to mark the completion of the hundredth locomotive for the Victorian Government. A special railway line was laid between the foundry and the Ballarat West Railway Station from where the new engine steamed along Armstrong Street to the Railway Station.

---

[15] Ballarat Historical Society. *Spielvogel Papers, Volume 1.* Ballarat: Ballarat Historical Society, 1982, p. 156.

[16] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, page 66.

[17] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, page 66-67.

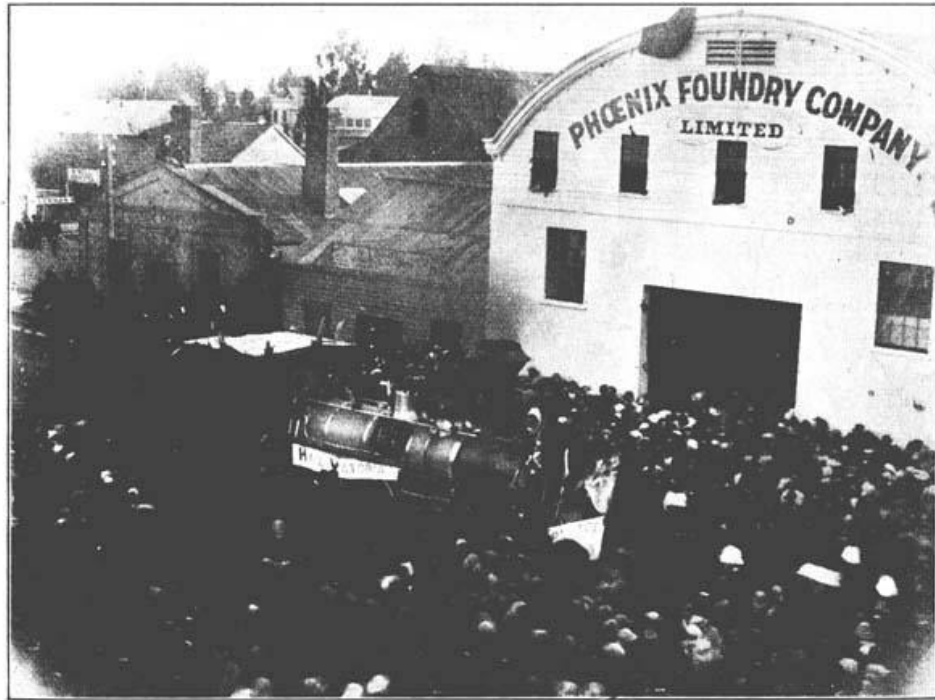[18] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, page 66.

[19] *The Argus* (Melbourne, Vic. : 1848 - 1956), Wednesday 30 August 1882, page 5. Digital copy accessed via Trove.

[20] Ibid, page 293.

ANCESTOR OF THE MIGHTY PACIFICS

" On Friday, April 13, the completion and delivery of the 100th locomotive engine manufactured at the Phœnix Foundry was made the occasion of a great public demonstration and attracted 15,000 spectators, who not only filled the streets but crowded the balconies, the windows and even the roofs of the houses on the route from the workshops to the Ballarat Railway Station. The strains of music from the bands and the lively peals of the town hall bells, combined with the cheers of the vast crowd when Miss Shaw, daughter of the Foundry Manager, named the great iron horse ' Victoria,' made the air ring with joy and glad-ness at this triumph of enterprise and native mechanical skill." Thus the Ballarat "Star" of 1883, commenting on the scene which this 46-year-old picture represents.   The locomotive was numbered S 207, and was therefore the forerunner of the modern Pacific giants S 300, S 301 and S 302

Public Record Office Victoria, VPRS 12800 P1, H 2413   © State of Victoria

Crowd in front of the Phoenix Foundry with the 100th locomotive manufactured, 1883.
Image: Public Records Office Victoria

'The completion of the 100th locomotive [by the Phoenix Foundry] was celebrated on the 13th April, 1883, when there were still greater rejoicings. Mr. Service (the Premier), other Ministers, and Parliamentary representatives were present, and the locomotive was decked with flags, and boughs, and flowers. Speeches, cheers, pealing of bells, banquets, a whole city keeping holiday, and the Tubal Cains of the great locomotive workshop of Victoria as the applauded heroes of the day, made up a series of sensations, long to be remembered'.[21]

When the railways commissioners proposed opening a locomotive works in Newport in 1885 - something that threatened the economy of Ballarat and district - two thousand people protested at a meeting held at the Alfred Hall.[22]

"By the end of 1886 the [Phoenix Foundry] company had delivered 203 complete engines with tenders, and the company's immense plant was so complete, its workmen so skilled,

---

[21] William Bramwell Withers. *The History of Ballarat from the First Pastoral Settlement to the Present Time*. Ballarat: F. W. Niven and Co., 1887, page 293. [University of Ballarat, Mt Helen Library].

[22] Bate, Weston. *Lucky City: The First Generation at Ballarat 1851-1901*. Melbourne: Melbourne University Press, 1978, p. 218. [University of Ballarat, Mt Helen Library].

its management so able, that practically the Phoenix Foundry seems to have made successful competition out of the question at present".[23]

The Phoenix Foundry became by 1887 … 'the largest locomotive factory in Victoria, securing against all competition the making of nearly the whole of the colonially manufactured engines. The company delivered the first locomotive to the Government on the 4th March, 1873, the next day's Courier saying:—"At five o'clock to the minute yesterday morning, locomotive No. 88 left the Phoenix Company's works, in Armstrong Street, on the steam lorry specially made for the conveyance of the engines and tenders to the railway station." By the 2nd April the engine had completed its 1000 miles test, and the feat was celebrated by bringing up a special train of Cabinet Ministers and others from Melbourne, by flags all over the city, by pealing of the Alfred Bells, and by a banquet in the city hall'.[24]

In 1887 the value of the Phoenix Foundry locally was 'seen in the distribution of near £2000 monthly in wages, and the creation of a school where hosts of youths learn one of the most valuable of all the mechanical arts'.[25]

In 1888 there was a coal strike in Newcastle which threatened coal supplies to Victoria, including Ballarat. "Should a colliery strike at Newcastle take place several of the principal factories here will have to stop work for want of fuel. At several of the gold mines coal is largely used, and without it the Phoenix Foundry must suspend operations. The Ballarat Gas Company has only a three weeks' supply in stock".[26]

1889 brought conflict to the Phoenix Foundry, when William Shaw attempted to subvert the dictates of the unions by enforcing a non-union shop.[27] This protracted event was known as the Ballarat Iron Workers Strike of 1889.

"Hard times continued for the employees in 1890, when the Maritime Strike of 1890 meant that the Phoenix Foundry was unable to source enough coal to continue its normal operations and they were forced to lay off over one hundred men". [28]

The Coal Shortage of 1890 caused "the stoppage of work at the Phoenix Foundry, Ballarat, owing to scarcity of coal, the circulation of £900 a week in wages c[illegible]".[29]

Despite the downturn in economic activity during the 1890s it was reported in 1902 that "In the promise of a new century saw 250 men employed in 1902".[30]

---

[23] Ibid, page 293.

[24] William Bramwell Withers. *The History of Ballarat from the First Pastoral Settlement to the Present Time*. Ballarat: F. W. Niven and Co., 1887, pages 292—293. [University of Ballarat, Mt Helen Library].

[25] William Bramwell Withers. *The History of Ballarat from the First Pastoral Settlement to the Present Time*. Ballarat: F. W. Niven and Co., 1887, page 293. [University of Ballarat, Mt Helen Library].

[26] *The Argus* (Melbourne, Vic: 1848 - 1956), Thursday 23 August 1888, page 8. Digital copy accessed via Trove.

[27] "Phoenix Foundry." *Wikipedia*. http://en.wikipedia.org/wiki/Phoenix_Foundry (accessed January 13, 2012).
[28] Bate, Weston. *Lucky City: The First Generation at Ballarat 1851-1901*. Melbourne: Melbourne University Press, 1978, p. 263. [University of Ballarat, Mt Helen Library].
[29] *Portland Guardian* (Vic. : 1876 - 1953), Monday 6 October 1890, page 3. Digital copy accessed via Trove

"....a bitter war erupted between the Phoenix Foundry and the Government Railway Workshop at Newport. The Newport Workshop had been able to successfully underbid the Phoenix Foundry for the contracts to build the new Dd class 4-6-0 light line locomotives; and the cry from Ballarat was that Newport had only been able to do this with undeclared subsidies from the Government. In October 1904 a Royal Commission was appointed to investigate the costs of production of light line locomotives at the Victorian Railways Newport Workshop and the Phoenix Foundry. The finding of the Commission was that the Phoenix Foundry had been profiteering - and could certainly make the locomotives at a more reasonable cost to the Government. Reportedly, Ballarat West MLA Scott Bennett felt that such unscrupulous business behavior was to be punished and decided that future Government contracts should not be given the Messrs Carter & Co (The Phoenix Foundry). [31]

Furthermore it was said that:

"A Royal Commission was held to look into this matter which led to a politically motivated accusation that the Phoenix Foundry was guilty of "profiteering".[32]

In 1905 the directors entered voluntary liquidation.

The Phoenix Foundry closed in 1906 due to the centralising policy of the Government, but at the Annual General Meeting of that year a motion was carried that there would be an endeavor to reorganise the company, and in event of their not being able to do so within one month, steps would be taken to wind it up. The reorganisation did not succeed. The opening of the Newport Railway Workshops forced the firm that at one time employed up to 700 men to close in July 1906 - with the plant being bought by Cameron & Sutherland (of Melbourne) for £25,000.[33]

The Phoenix Foundry manufactured a total of 361 locomotives of which 352 were for the Victorian Railways.[34]

"If the Phoenix directors had had a crystal ball, they would quite likely have gone to some lengths to keep the company going. The changes to railway motive power in the first decade of the twentieth century were so great that they rivalled the impact of dieselisation half a century later, as a result, locomotives were to be produced in great numbers.[35]

---

[30] Bates, Weston, Lucky City: The First Generation at Ballarat 1851-1901, Melbourne University Press, 1978, page 215.

[31] Ballarat Historical Society. *Spielvogel Papers, Volume 1.* Ballarat: Ballarat Historical Society, 1982, p. 156. [Geoffrey Blainey Research Centre, Historical Collection].

[32] Ballarat Historical Society. *Spielvogel Papers, Volume 1.* Ballarat: Ballarat Historical Society, 1982, p. 156.

[33] Ballarat and District Industrial Heritage Project, Ballarat University, Phoenix Foundry; General reference can be found at: http://bih.ballarat.edu.au/index.php/Phoenix_Foundry This web site did not quote a reference for this quote.

[34] The source of this quote to be investigated further.

[35] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, page 140.

Two things happened during the first decade of the twentieth century. Firstly there was further rapid development of the Victorian Railways network. Secondly there was a realisation within the Victorian Railways that they had been following outmoded designs from British sources and that there were better ways to build locomotives which involved much less maintenance effort. British locomotive designers had predominantly followed the locomotive design model of placing cylinders and valve gear inside the frames of the locomotive. This made these high maintenance parts of the locomotives hard to access for maintenance.

American designers moved to cylinders and valve gear outside the frames where the motion work was much more accessible for maintenance. Locomotives bought by Victorian Railways from the USA around the turn of the century provided models for a rethink of locomotive design in Victorian Railways and led to accelerated retirement of older styles of locomotives.

Having driven Phoenix Foundry out of business Victorian Railways were in desperate need of new locomotives. Initially this demand was met by Newport Workshops who reached one locomotive produced per week around 1913 and 1914.[36]

Locomotives were purchased from overseas and contracts were let to other contractors including Thompsons of Castlemaine and Walkers of Maryborough, Queensland. [37]

Post-closure activities on the Phoenix Foundry site

"A remarkable story of industrial development is associated with the business of Messrs. Lucas and Co, white work manufacturers. Fifteen years ago their work was done in one room of a dwelling-house, but as time passed more and more commodious premises had to be secured. At present they are employing over 300 girls to meet their Victorian and interstate orders, but find that this staff is insufficient for their rapidly-increasing requirements. It has now been decided to add considerably to the existing establishment, which is on part of the site of the old Phoenix Foundry.

Additions to the building will involve the firm in an initial expenditure of £1,500, and when these are complete room will be afforded for 200 more sewing-machines, the whole of which well be driven by electricity, that being the motive-power now in use".[38]

"My enlarged engineering factory on the site of the old Phoenix Foundry is almost completed. It was my intention to invite the two councils and leading business and manufacturing men to inspect the whole plant. The happy idea of the "Forward Ballarat" Committee to have a Factory Day, and also a working display right up the Sturt Street gardens from Bridge Street, gives me the very opportunity I require, and I will be delighted,

---

[36] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, page 143.

[37] Robert Butrims and David Macartney, The Phoenix Foundry, Australian Railway Historical Society Victorian Division Inc, 2013, pages 141, 143.

[38] *The Argus* (Melbourne, Vic. : 1848 - 1956), Tuesday 13 December 1910, page 4. Digital copy accessed via Trove.

not only to show my own factory, but have a working exhibit in Sturt Street on Friday, [illegible]th October, and I sincerely hope the whole of our manufacturers will seize the opportunity to show what we are doing in this centre, and that the public and outside residents will support it by their presence and interest".[39]

3.19 Heritage Listings:

None known.

---

[39] The Ballarat Courier (Ballarat, Vic: 1914 - 1918), Saturday 16 September 1916, page 3. Digital copy accessed via Trove. This quote is attributed to F Wiles.

4 Assessment of Significance

4.1 Historical Significance:

4.2 Historic Individuals or Association:

Phoenix Foundry: Refer Appendix 3.

4.3 Creative or Technical Achievement:

Phoenix Foundry: The mining machinery manufactured by the company covered a very wide range of products. Stationary steam engines were produced and from surviving examples we know that these products were of very high quality and longevity. The very large number of railway locomotives produced by the company provided the principal source of motive power for the Victorian Railways for several decades. Several locomotives remain by which we can judge the quality of the production.

4.4 Research Potential:

Phoenix Foundry: More details of the machinery and manufacturing methods of the Phoenix Foundry would be informative. Whilst the establishment is described in glowing terms as being of a superior nature little detail is evident. Further research in this area would be helpful.

No plan of the facilities of the Phoenix Foundry are known to exist. Analysis of drawings would be of considerable research interest.

 Turntable Pivot: Drawings and details of the turntable have not been discovered. Analysis of drawings and other details would be of considerable research interest.

4.5 Social:

Phoenix Foundry: The company was a substantial employer in Ballarat and a factor in the ongoing prosperity of the community following the Gold Rush. It was a large employer over a long period and therefore was a major stakeholder in the development of the Ballarat community.

4.6 Rarity:

Phoenix Foundry: Although claims of the superiority of the Phoenix Foundry over others have been made[40] there were many manufacturing establishments in Ballarat and elsewhere throughout Australia producing machinery during the second half of the 19th century. It can

---

[40] Graeme Cope, Shaw, William Henry (1830-1896), Australian Dictionary of Biography, National Centre of Biography, Australian National University, first published in hardcopy in Australian Dictionary of Biography, Volume 6, Melbourne University Press, 1976.

therefore be described as representing the better class of machinery manufacturing establishments, but not rare.

4.7 Representativeness:

The Phoenix Foundry was typical of manufacturing factories in Ballarat, elsewhere in Victoria and elsewhere in Australia although it was larger than most. In this era there was a strong emphasis on self-sufficiency in manufacturing in Australia and the multitude of manufacturers were evidence of this. The Phoenix Foundry was represented this pride in manufacturing excellence in the country.

4.8 Integrity/Intactness:

Nothing of the foundry remains. The turntable pivot foundation is apparently the only remaining evidence of the foundry works. It is therefore appropriate to use the pivot to represent the foundry so that the important story of the foundry can be told with some context.

5 Statement of Significance:

Phoenix Foundry: The Phoenix Foundry was one of several large engineering works in Ballarat during the period following the Gold Rush and during a time when Australia aspired to develop manufacturing industries to support the nation. The presence of these large industries in Ballarat assisted in consolidating the growth of the city following the Gold Rush and establishing its early reputation as a manufacturing hub.

During its early years (1857 to 1871) it specialised in the production of equipment for the gold mining industry and thereafter concentrated on the construction of railway locomotives between 1871 and closure in 1906.

Phoenix Foundry manufactured high quality product and established a reputation far beyond its local importance. It was the principal manufacturer of railway locomotives for the Victorian Railways during a key period of railway development in Victoria.

The foundry site has been redeveloped and nothing survives on the site.

Turntable Pivot: A railway turntable pivot does however remain in a public street in front of the foundry site and has been preserved in current street landscaping.

6 Area of Significance:

Local and State.

7 Interpretation Plan:

7.1 General Approach

The ceremony should be held on **Saturday 12 October 2013 at 2:00 pm,** in association with the Engineers Australia Country Weekend to be held in Ballarat on 12 and 13 October 2013.

This date apparently has no particular significance as far as the story of the Phoenix Foundry is concerned.

The interpretation panel can be located near the turntable pivot foundation when viewed from the footpath as show in the image below:

The turntable pivot alcove viewed from the footpath in front of the Rivers store in Armstrong Street. In this image the likely location of the interpretation panel (1200 x 600) has been superimposed on the image to the pivot alcove.
Image: Owen Peake

7.2 General Attributes of the Interpretation Panel:

1) A title **"Phoenix Foundry".**
2) Logos of Engineers Australia and City of Ballarat.
3) A full size (300 mm diameter) representation of the EHA marker plate.
4) The date and other details of the marking ceremony.
5) Text should be 24 point Arial Bold.
6) Selected photographs and brief captions for each photograph including attribution.

7.3 The Interpretation Panel:

1) Size to be nominally 1200 mm wide by 600 mm high.

2) The panel to be constructed of vitreous enamel-on-steel plate with flanges as per drawing at Appendix 9.

3) The panel to be mounted on the concrete wall adjacent to the turntable pivot enclosure preferably to the left of the pivot foundation as shown in the image above.

7.4 Possible Interpretation Themes & Preliminary Text Blocks for Interpretation Panel

The following four themes are suggested for the interpretation panel, in accordance with established best-practice:

Total text should not exceed 500 words excluding headings.

- **The History of the Phoenix Foundry**
- **The Products of the Phoenix Foundry**
- **William Henry Shaw, General Manager of the Phoenix Foundry**
- **The Turntable Pivot**

7.4.1

The history of the Phoenix Foundry

The Phoenix Foundry was a very significant manufacturing business during its 50 years of operation. It was one of reputedly 40 foundries in Ballarat during the heyday of manufacturing in Victoria in the 1880s. Phoenix Foundry was one of the largest foundries in Ballarat although there were other large enterprises including the nearby Union Foundry.

None of the buildings or machinery of the Phoenix Foundry have survived.

The Phoenix Foundry started up in 1856 to manufacture of mining machinery during its first fifteen years of operation. It produced steam engines to drive mining machinery, stamping mills and other gold extraction machinery.

In 1971 it received its first order for steam locomotives from the Victorian Railways and by 1873 the first locomotive had been completed. Over three hundred locomotives, of many different classes were produced.

The directors of the Phoenix Foundry entered into voluntary Liquidation in 1905 and the foundry closed its doors in 1906.

154 words

7.4.2

The Products of the Phoenix Foundry

Although Phoenix Foundry built a vast array of machinery we tend now to concentrate on what remains.

Only one stationary steam engine manufactured by Phoenix Foundry is known to exist. This beautiful 80 horsepower (60 kW) engine is a horizontal tandem compound mill engine manufactured in circa 1888. This engine has had several homes but it now drives the gold stamping mill at Sovereign Hill, Ballarat.

Four locomotives have been preserved along with fragments of a fifth locomotive. One locomotive, Y-112 of 1889, owned by Steamrail Victoria is in operation and is based at Ballarat East.

106 words

7.4.3

William Henry Shaw

William Henry Shaw (1830-1896), engineer and iron founder, was born on 27 July 1830 in Belfast, Northern Ireland. He arrived in Melbourne at the time of the Gold Rush in 1853.

Shaw was the manager of the Phoenix Foundry from its establishment in 1856 until he died in 1896.

Under Shaw's skilful and enterprising management, the company prospered and employed over 350 hands. The foundry was modernized after Shaw visited Britain in 1871 and the establishment was reputedly the most advanced of its type south of the equator. He was so closely identified with the company that the celebration of the manufacture of the one-hundredth locomotive in April 1883 took the form of a public compliment to his 'energy and practical experience and indomitable perseverance'. 'Without the Phoenix Foundry', observed the *Ballarat Star*, 'Ballarat would feel insignificant among the cities of Australia'.

139 words

7.4.4

The Turntable Pivot

The Phoenix Foundry manufactured large numbers of locomotives for the Victorian Railways but its premises were not close to a railway line. Initially a steam wagon was used to transport locomotives to the closest railway siding however later a railway line was built in Armstrong Street to convey locomotives to the railway. The turntable was built in the street to turn locomotives coming out of the foundry onto this line.

The concrete foundation of the turntable pivot adjacent to this panel is the only remaining evidence of the Phoenix Foundry.

91 words

Total word count = 481 words without headings

8 References:

William Bramwell Withers, *The History of Ballarat from the First Pastoral Settlement to the Present Time,* F W Niven & Co, Ballarat, 1887.

Bates, Weston, Lucky City: *The First Generation at Ballarat 1851-1901*, Melbourne University Press, 1978.

Ballarat Historical Society. *Spielvogel Papers, Volume 1,* 1982.

Graeme Cope, Shaw, William Henry (1830-1896), *Australian Dictionary of Biography*, National Centre of Biography, Australian National University, first published in hardcopy in Australian Dictionary of Biography, Volume 6, Melbourne University Press, 1976.

Robert Butrims and David Macartney, *The Phoenix Foundry - Locomotive Builders of Ballarat - The History of a Ballarat Engineering company,* Australian Railway Historical Society, Victorian Division Inc, 2013.

Nomination prepared by:

Owen Peake
FRMIT HonFIEAust CPEng
Chair
Engineering Heritage Victoria
4 Islington Street
Collingwood Victoria 3066
Phone: +61 3 9419 0820 (home and work)
Email: owen.peake@bigpond.com

With assistance from:

Mike Caldwell
Ballarat Regional Group
Engineers Australia
10 Alexander Avenue
Wendouree Victoria 3355
Phone: +61 3 5339 6164
Email: mikec@ncable.net.au
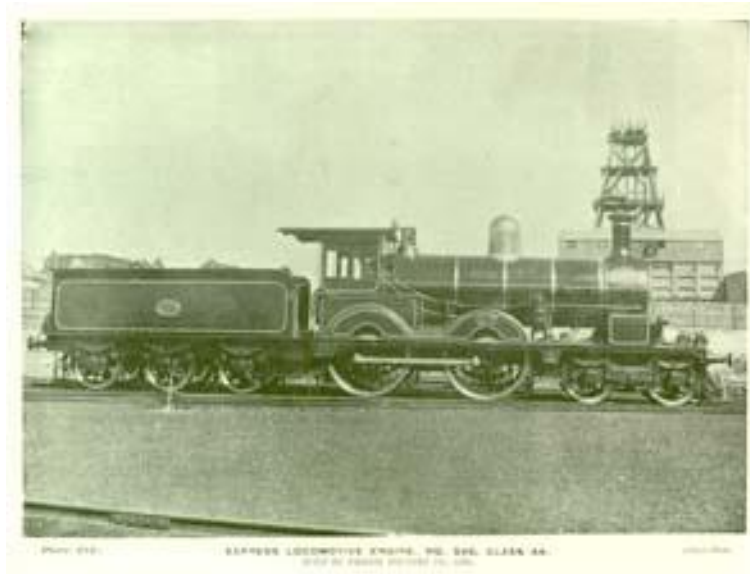
Appendix 1:

Images with captions

Phoenix Company's foundry, Ballarat, 1882, **hand coloured wood engraving on paper,
Art Gallery of Ballarat, purchased with funds from the L J Wilson Bequest, 1995.**

**The image depicts: the steam hammer; pouring molten metal; punching rivet holes; the
grindstones; fitting up a steam locomotive, and lorry, taking engine to the station.**

**Note that the lower part of the illustration shows the steam wagon used to transport
locomotives from the foundry to the railway prior to the construction of the line in Armstrong
Street and the railway turntable.**
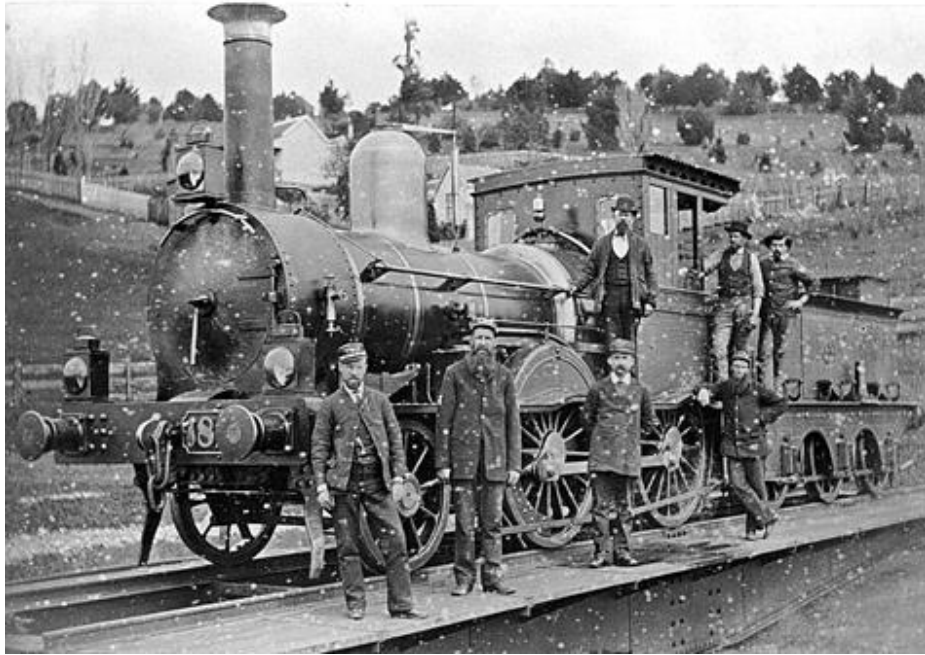
Image: The Australian Sketcher

**Phoenix Foundry Express Locomotive Engine, Class AA, No. 543.
These locomotives were built in 2 batches between 1900 and 1903 and saw service
from 1900 until 1932. They weighed 92.6 tonnes**

Image: University of Ballarat Historical Collection. [Cat. No. 6597].

Phoenix Foundry employees and the Express Locomotive they built.

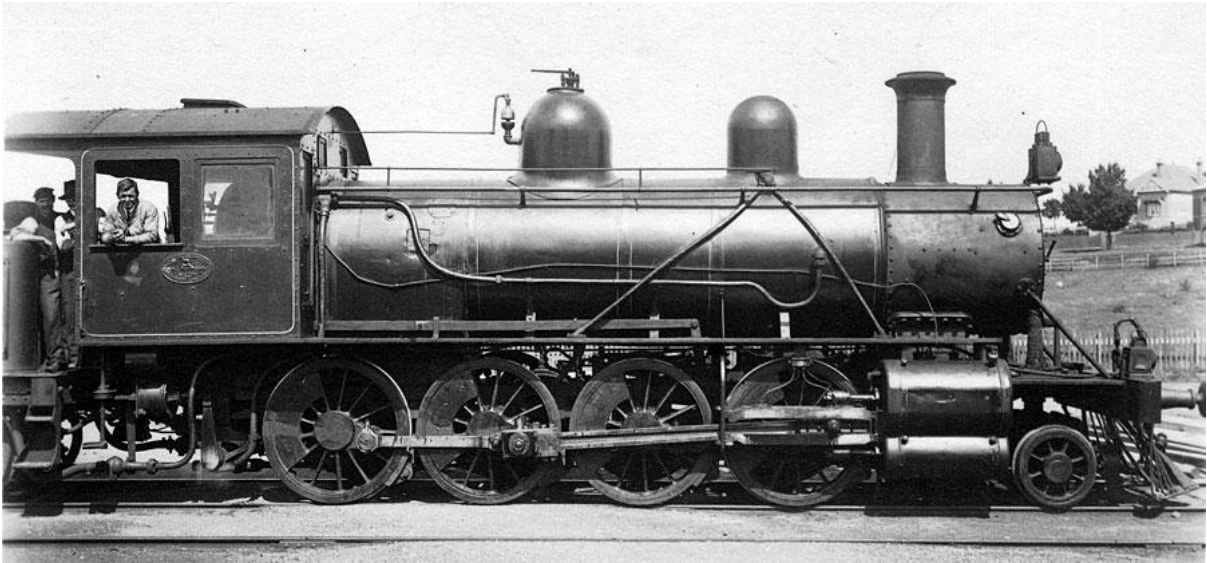*Image: University of Ballarat Historical Collection [Cat. No. 6599.3].*

F class locomotive. Location unknown.

Image: Museum Victoria 154297

Phoenix Foundry nameplate from Engine No.111 of 1883.
This plate came from the eighth of a group of ten '1st' S class 4-6-0 goods numbered 197 to 215 (odd numbers), all built 1883.

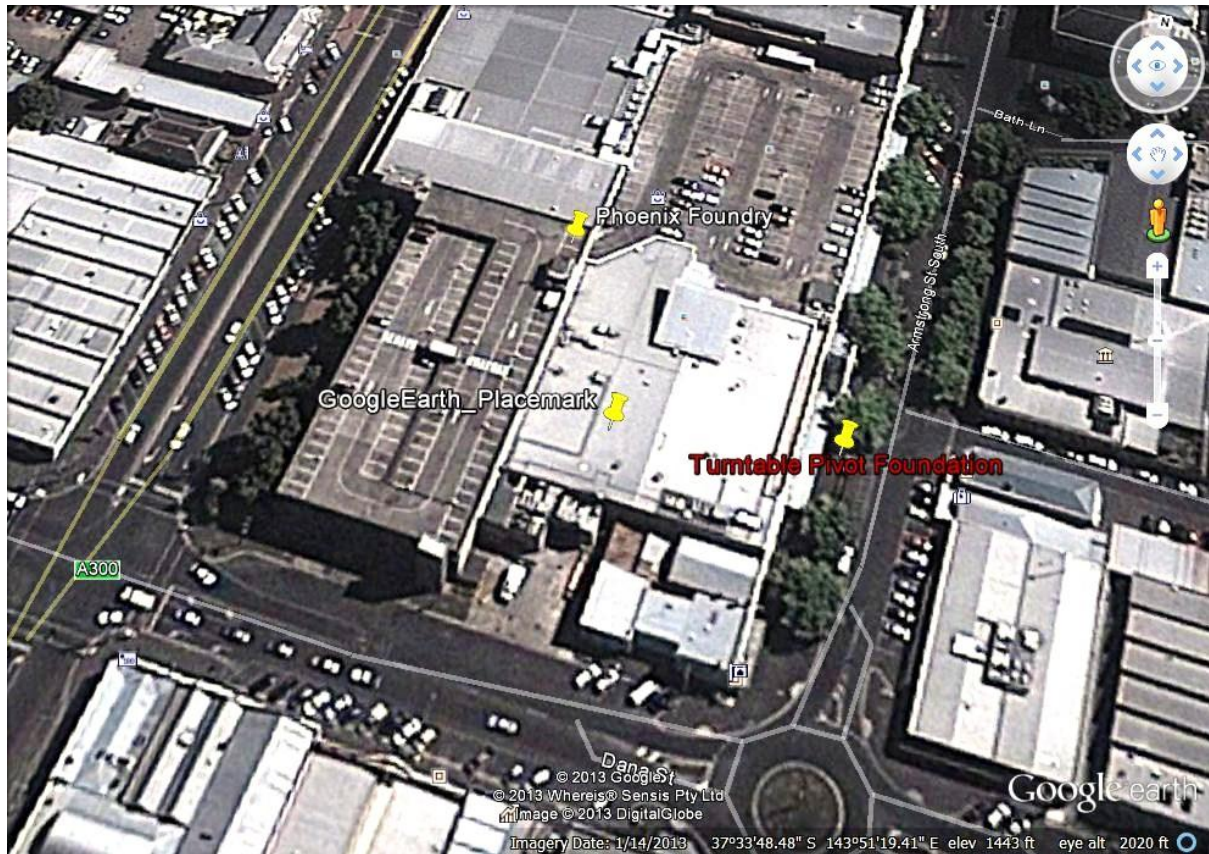*Image: Ralph Durr, Talbot, Victoria https://swites.google.com/site/ralphdurr*

Phoenix Foundry V-class locomotive built in 1901/02.
Fifteen of these very successful 2-8-0 compound locomotives were built by Phoenix Foundry.
They were based on a single imported Baldwin "model" locomotive.

Image: Mark Bau Victorian railways web page
www.victorianrailways.net/motive%20power/vsteam/vsteam/html

Appendix 2:

Map

The site of the Phoenix Foundry. The foundry is known to have had frontages to Dana Street (the road running from left to right of this image), Armstrong Street South (running vertically to the right) and Doveton Street (to the left). The Turntable Pivot Foundation is marked in Armstrong Street South.

Image: Google Earth

Appendix 3:

Historic Individuals or Associations

3.1 William Henry Shaw (1830–1896)[41]

William Henry Shaw, Manager at the Phoenix Foundry, 1870 to 1896, Ballarat Historical Society Collection (Cat. No. 034.81), held at the Gold Museum.

Image: Sovereign Hill Museums Association

---

[41] Graeme Cope, 'Shaw, William Henry (1830–1896)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/shaw-william-henry-4565/text7491 accessed 16 August 2013. This article was first published in hardcopy in *Australian Dictionary of Biography*, Volume 6, (MUP), 1976.

William Henry Shaw (1830-1896), engineer and ironfounder, was born on 27 July 1830 in Belfast, Northern Ireland, son of James Shaw, builder and contractor, and his wife Mary, née Hunter. After working for his father, he was apprenticed to Gray Bros' Townshend Street foundry where he learnt all branches of ironworking but specialized in the mechanical drafting that greatly advantaged his later career. In 1852 he left Belfast to work for the Cork Steamship Co. Lured by gold, Shaw arrived in Melbourne in October 1853 but had little luck at Ballarat, Daylesford and Blackwood. He opened and managed a small foundry for Frederick Moore in Geelong before returning to Ballarat early in 1856 to join the moulder Robert Holden and two Lancashire-trained enginesmiths, Robert Carter and George Threlfell, in launching the Phoenix Foundry. The business prospered and by November 1861 was employing ninety-six hands on a wide range of products. Shaw was proud that the eight-hour day had been worked from c.1858 and that his employees did as much in that time as Englishmen did in ten hours.

At the time of a temporary decline in mining and an increase in protectionism, the firm became a public company in November 1870 and further diversified its output: in August 1871 it successfully tendered for the first of the Victorian government locomotive contracts. By January 1884, under Shaw's skilful and enterprising management, the company had capital in excess of £30,000 and employed over 350 hands; modernized after his visits to Britain in 1871 and 1885, it was reputedly the most advanced of its type south of the equator. He was so closely identified with the company that the celebration of the manufacture of the one-hundredth locomotive in April 1883 took the form of a public compliment to his 'energy and practical experience and indomitable perseverance'. 'Without the Phoenix Foundry', observed the *Ballarat Star*, 'Ballarat would feel insignificant among the cities of Australia'. In the 1880s dividends were declared for the first time and 200 locomotives were completed by October 1887. Thereafter the company faced difficulties. In 1889 Shaw's attempt to exclude members of the Ironworkers' Assistants' Society and to enforce a non-union shop produced a bitter conflict. Free traders' criticism of the Phoenix as a quasi-government workshop became more vocal as markets for both engines and mining equipment diminished because of depression, government manufacture at Newport and a declining rate of railway expansion; in 1906 the foundry was forced to close.

A justice of the peace, Shaw died in Ballarat on 23 August 1896, survived by his wife Annie Eliza, née Cleeland, seven sons and four daughters; he was buried in Ballarat cemetery. His estate was sworn for probate at £2250.

Select Bibliography

- A. Sutherland et al, *Victoria and its Metropolis*, vol 2 (Melb, 1888)
- J. L. Buckland and W. Jack, 'The locomotive builders of Ballarat', Australian Railways Historical Society, *Bulletin*, 12 (1961)
- *Ballarat Star*, 27 Nov 1861, 12 Jan 1884
- *Ballarat Courier*, 14 Apr 1883, 24 Aug 1896, 20 Sept 1906
- G. S. Cope, Some Aspects of the Metal Trade in Ballarat, 1851-1901 (M.A. thesis, University of Melbourne, 1971).

3.2 Thomas Higinbotham[42]

Thomas Higinbotham (1819-1880), engineer and civil servant, was born in Dublin, the third son of Henry Higinbotham, merchant, and his wife Sarah, née Wilson. Educated in Dublin at Castle Dawson School and the Royal Dublin Society House, Higinbotham moved to London about 1839. At first he worked for a firm that promoted railway companies, and often appeared before parliamentary committees on railways. He then worked for several years as an engineer on British railroads and won high repute in his profession. He was elected a member of the Institution of Civil Engineers on 7 February 1854.

In 1857 Higinbotham followed his younger brother George to Melbourne. He joined his brother's household first at Emerald Hill and after 1860 near the beach at Brighton in a villa which Thomas was chiefly responsible for designing. He never married and lived with his brother, sister-in-law, nephews and nieces till 1880 in a relationship characterized by remarkable tolerance, friendship and respect despite strong differences in political opinion.

After a short time in private practice in Melbourne, Higinbotham was appointed Inspector-General of Roads and Bridges. In 1860 he became Engineer-in-Chief of the Victorian Railways. He supervised the surveying and construction of all new Victorian lines and also guided the settlement of such railway questions as city stations and facilities and the lighting of trains. He fearlessly contested proposals that he considered unsound, such as cheap narrow-gauge lines, and showed great vision in advocating a railway renewals fund, construction of Melbourne's outer-circle railway and adaptations to permit unbroken rail traffic between Sydney and Melbourne. At the government's request in 1874-75 he investigated and reported on the latest developments in railway construction and management in Europe, America and India. With other senior public officials he was removed from office in January 1878 by the Berry government. In the next two years he was invited by the South Australian, Tasmanian and New Zealand governments to report on their railway systems. In March 1880 the Service government reappointed him Engineer-in-Chief of the Victorian Railways, but the ministry soon fell and he was unhappy under its successor. He had decided to resign but died in his sleep on 5 September.

---

[42] This biography is reproduced from the Australian Dictionary of Biography, online version.

Thomas Higinbotham

Higinbotham was one of that select band of English railway engineers who exercised a profound influence on the development of Australian communications in the second half of the nineteenth century. They provided practically the only mark of distinction in the Australian colonies' railway departments of the day. But their efforts were not enough to provide firm foundations for sound management as political pressures developed. Though Higinbotham did not live to see the change, his own Victorian service became the first candidate for management by public corporation when the system of political control was formally discredited in 1883.

Higinbotham was an Anglican and for many years a member of the Royal Society of Victoria. His loss was greatly lamented by a society in which public officials of such widely-acknowledged integrity were all too rare. His property, valued at £21,000 ($42,000)[43], was left to his brother George and his family with the request that the family name be changed to Verner, the maiden name of his paternal grandmother. This odd request was not a condition and was therefore ignored.

---

[43] In current day (2010) dollars this estate would have been valued at $2.206 million. Phillips Brett, *The Australian Phillips Curve in the Long Run,* July 2007. Figure 1 of this paper shows Australian Consumer Price Index from 1850 to 2006. Extrapolating this curve from 2006 to 2010 at 3% per annum gives a ratio of prices between 1880 and 2010 (130 years) of 52.5.

3.3 William Meikle[44]

Locomotive Superintendent Whitehaven & Furness Junction Railway. Chambers (*Loco. Mag.*, 1900, 5, 42-50) calls him "Meikley".); also briefly (1864-5) of the Dublin & South Eastern Railway (he came for interview from Whitehaven and according to Shepherd, *The Dublin & South Eastern Railway,* returned thence).

He was Irish.

This could be the same William Meikle who was General Overseer of Locomotives and Workshops in the Victorian Railways in 1877.

---

[44] Steamindex web site, www.steamindex.com/index.hgtml, List of Mechanical Engineers, downloaded 16 August 2013.

Appendix 4:

Model Locomotive Engine Created by Apprentices from the Phoenix Foundry, Ballarat [45]

Model Locomotive Engine, Ballarat Historical Society Collection (78.0953)

Image: Gold Museum Collection

One of the highlights from the Ballarat Historical Society Collection is this working model of a locomotive engine. It was manufactured by five apprentices from the local Phoenix Foundry Company for the Australian Juvenile Industrial Exhibition held in Ballarat in 1878.

Established in 1856/57, the Phoenix Foundry was one of the most important iron and brass manufacturers in Ballarat. In 1871, the Foundry began building locomotive engines, and from 1873 until its closure in 1906, it held the government contract to build all the engines for the Victorian Railways.
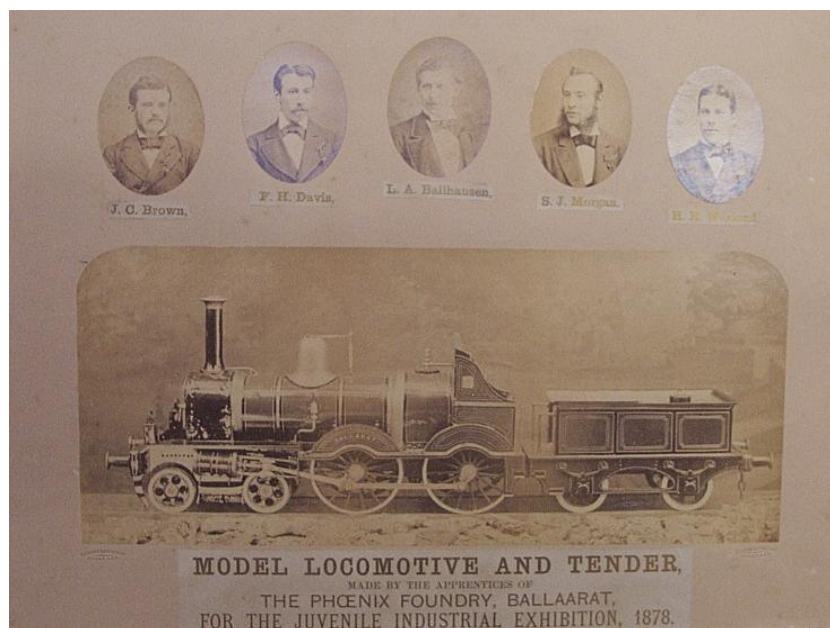
---

[45] Copied from the web site of the Gold Museum, Ballarat, www.goldmuseum.com.au/phoenix-foundry-model-locomotive-engine/ Downloaded 12 August 2013.

100th Engine made by Phoenix Foundry Ballarat, April 13th, 1883

Image: Ballarat Historical Society Collection (218.80)

On 15th February 1878, the first Australian Juvenile Industrial Exhibition was held in Ballarat. Inspired by the Industrial Exhibitions of England, it aimed to "cultivate the inventive faculties of those who are in trades," and "to enable all to show their handiwork, and obtain new ideas from each other" [46]

Model Locomotive and Tender made by the Apprentices of the Phoenix Foundry, Ballarat, for the Juvenile Industrial Exhibition, 1878.
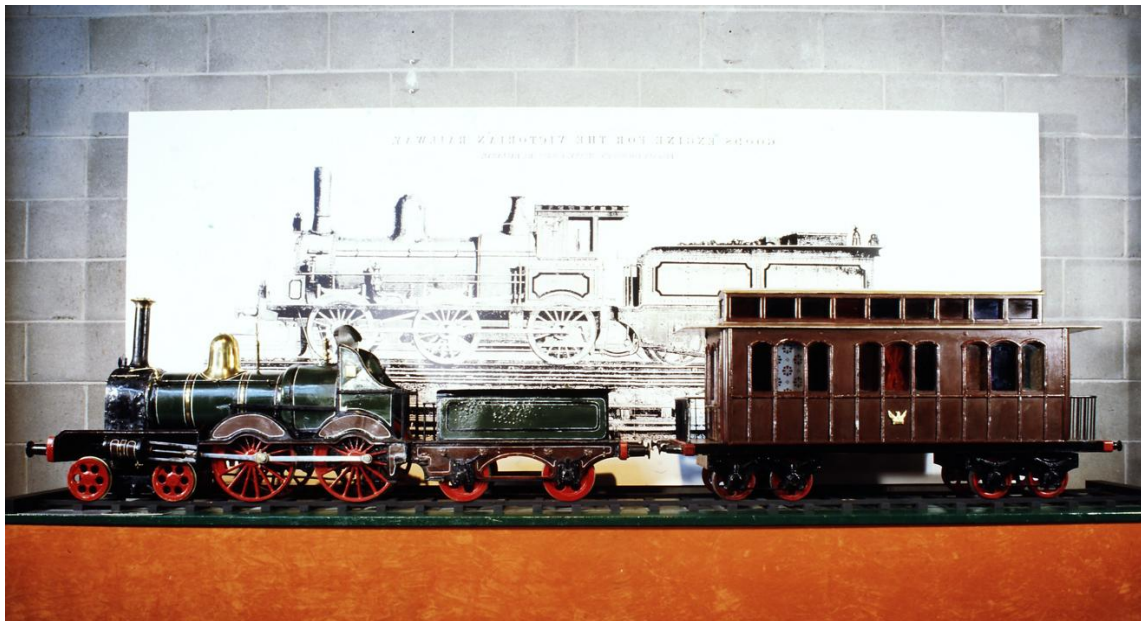
Image: Ballarat Historical Society Collection (218.80)

---

[46] Official Record, page 7.

Amongst the entrants were a group of young apprentices from the Phoenix Foundry *(depicted in the above image with their creation)*. The young men featured here are: James C. Brown, Francis H. Davis, Louis A. Ballhausen, Samuel J. Morgan and Herman R. Warlond. They were all aged between 19 and 21 at the time of the exhibition.

Each of these exhibitors was awarded a silver medal, plus special prizes of £20.20s from two Melbourne judges. The Official Record of the Exhibition also commented that it was "a splendid piece of work, deserving of high commendation."

Interestingly, the *Official Record* lists two additional apprentices who were involved in the project: Theos. George and William S.T. Magee. According to articles in the *Ballarat Courier* during July 1879, there was a dispute between Mr. George and Mr. Magee against the other five over the amount each had (or hadn't) contributed to the project. More research is needed to determine how the matter was resolved, but it is telling that only five apprentices were featured in the formal photograph shown above.

Model Locomotive Engine, Tender and Carriage as originally displayed in the Gold Museum

Image: Ballarat Historical Society Collection (78.0953)

The model locomotive engine and tender the apprentices created were crafted from steel, while the carriage was made from wood and highlighted with smoky glass windows. It has run over 2,000 miles on rail track, and has been restored to working order by Mr. H. Shaw, son of the late Mr William Henry Shaw, a Manager at the Phoenix Foundry Company. The model is currently on display in the Gold Museum, but the tender and carriage remain in storage.

Model Dimensions:

Engine
Height: 58cm Base: 130cm Diameter: 30cm
Tender
Height: 30cm Base: 54cm Diameter: 11cm
Carriage
Height: 58cm Base: 1220cm Diameter: 34cm
Track
Height: 3cm Base: 3000cm Diameter: 46cm

For more information, please see:

Ballarat and Industrial Heritage Project; Victorian Railways; Encyclopedia of Australian Science; Museum Victoria, "Bronze Medal from the Australian Juvenile Industrial Exhibition" (1878); Ballarat Historical Society.

Appendix 5:

Locomotives Manufactured by Phoenix Foundry[47]

Locomotives built by the Phoenix Foundry for the Victorian Railways included:[48] [49]

- O class 0-6-0 goods: 131 to 143 (odd numbers). Built 1878-1879. Last one scrapped in 1922.
- B class 2-4-0 passenger 186 and 188. Built 1880-81. Scrapped in 1914 and 1911 respectively. [50]
- F class 2-4-0 passenger 126 to 144 (even numbers) and 166 to 184 (even numbers). Built 1876-1879. Last one scrapped in 1925.
- Q class 0-6-0 goods: 83 to 101 (odd numbers). Built 1873, first locomotives by Phoenix. Last one sold in 1908.
- U class 0-6-0 goods: 107 to 123 (odd numbers). Built 1874. Last one scrapped in 1908.
- T class 0-6-0 goods: 249 to 283 (odd numbers). Built 1884.
- '1st' K class 2-4-0 passenger 114 to 124 (even numbers). Built 1874. Last one scrapped in 1905.
- '1st' H class 4-4-0 passenger 146 to 160 (even numbers). Built 1877. Last one scrapped in 1916.
- M class 4-4-0 tank passenger 210 to 240 (even numbers) and 312 to 320 (even numbers). Built 1884-86. Last one scrapped in 1922.
- 'Old' R class 0-6-0 goods: 157 to 195 (odd numbers). Built 1881-86. Last one scrapped in 1944.
- '1st' C class 4-4-0 well tank passenger 42, 262 to 276 (even numbers) and 306 to 310 (even numbers). Built 1882-83. Last one scrapped in 1916.
- '1st' S class 4-6-0 goods: 197 to 215 (odd numbers). Built 1883. Last one rebuilt to W class in 1908.
- D class 4-4-0 passenger: 82, 92, 122, 242, 244, 248, 250, 260, 322 to 344 (even numbers). Built 1887-88. Last one scrapped in 1928.
- '1st' X class 0-6-0 goods: 353 to 381 (odd numbers). Built 1886-87. Last one scrapped in 1920.
- E class 2-4-2 tank suburban passenger: 346 to 394 (even numbers). Built 1889-90. Last one scrapped in 1920.
- E class 2-4-2 tank suburban passenger: 12, 34, 36, 428 to 460 (even numbers). Built 1892-94.
- 'New" A class 4-4-0 passenger: 396 to 424 (even numbers). Built 1889-91. Last one scrapped in 1925.
- Y class 0-6-0 goods: 383 to 441 (odd numbers). Built 1889.
- Z class 2-4-0 tank passenger motor engine: 522 and 524. Built 1893, scrapped in 1910 and 1911.

---

[47] Wikipedia, Phoenix Foundry, version dated 5 May 2013, downloaded 17 August 2013.

[48] VicRail Public Relations (1981), *Power Parade,* ISBN 0-7241-3323-2.

[49] Cave, Buckland & Beardsell (2002). *Steam Locomotives of the Victorian Railways - Volume 1: The First Fifty Years*. Melbourne: ARHS. ISBN 1-876677-38-4.

[50] Cave, Buckland & Beardsell (2002). *Steam Locomotives of the Victorian Railways - Volume 1: The First Fifty Years*. Melbourne: ARHS. ISBN 1-876677-38-4, page 51.

- E class (3rd series) 0-6-2 tank goods: 462 to 470 (even numbers). Built 1893 as EE class, reclassed as E class (3rd series) in late 1920s.
- V class (2nd series) 2-8-0 goods: 501 to 529 (odd numbers). Built 1901-02, last scrapped in 1930.
- A^A class 4-4-0 passenger: 20 locomotives: 530 to 558, 562 to 570 (even numbers). Built 1900-03, last scrapped in 1940.[51]
- Dd class 4-6-0: 7 locomotives, 602 to 610 (even numbers), 632, 634. Built 1904. Last one (Dd 634, renumbered D1 505) withdrawn in August 1941 and later scrapped. [52]

---

[51] Oberg, Leon (2007). *Locomotives of Australia 1854-2007*. Rosenberg Publishing. pp. 83–84, ISBN 1-877058-54-8.

[52] Cave, Buckland & Beardsell (2002). *Steam Locomotives of the Victorian Railways - Volume 1: The First Fifty Years*. Melbourne: ARHS. ISBN 1-876677-38-4, page 202.

Appendix 6:

Remaining Products of the Phoenix Foundry - Railway Locomotives

Five locomotives manufactured by Phoenix Foundry are known to remain. [53] Details are shown in the table below:

Year	VR Class & Number	Tractive Effort (pounds)	Weight (tons)	Bore and Stroke (inches)	Wheel Configuration	Current Location	Boiler Pressure (psi saturated)
1880	F-176[54]	10,580	42.5	15.75 X 20	2-4-2T[55]	Australian Railway Historical Society Museum, North Williamstown	160
1884	T-94[56]	13,660	55.7	16.5 X 20	0-6-0	Australian Railway Historical Society Museum, North Williamstown	160
1888	Y-395[57]	21,840	74.0	18 X 26	0-6-0		175
1889	Y-109			18 X 26	0-6-0[58]		
1889	Y-112	21,840	74.0	18 X 26	0-6-0	Steamrail Victoria, Ballarat East	175

All locomotives are 5'3" gauge.

All locomotives have Stephenson link motion and D-slide valves.

---

[53] Matthew Churchward, The Victorian Steam Heritage Register, Scienceworks, Museum of Victoria,1994, page 110.

[54] Later used at Sunshine Harvester Works.

[55] This locomotive was originally a 2-4-0 tender locomotive.

[56] Previously T-265.

[57] Previously Y-108.

[58] Frames only, rebuilt as part of an 0-6-0 diesel mechanical locomotive. Number Y-109 was taken off the register 23 December 1954 and frame and wheels sold to the Brunswick Plaster Mills Ply. Ltd who rebuilt it into a diesel-mechanical locomotive for service on a siding which provided access to a gypsum deposit in north western Victoria near Nowingi.

Phoenix locomotive F-176.
Now located at the Australian Railway Historical Museum at North Williamstown. Image taken in May 2003.
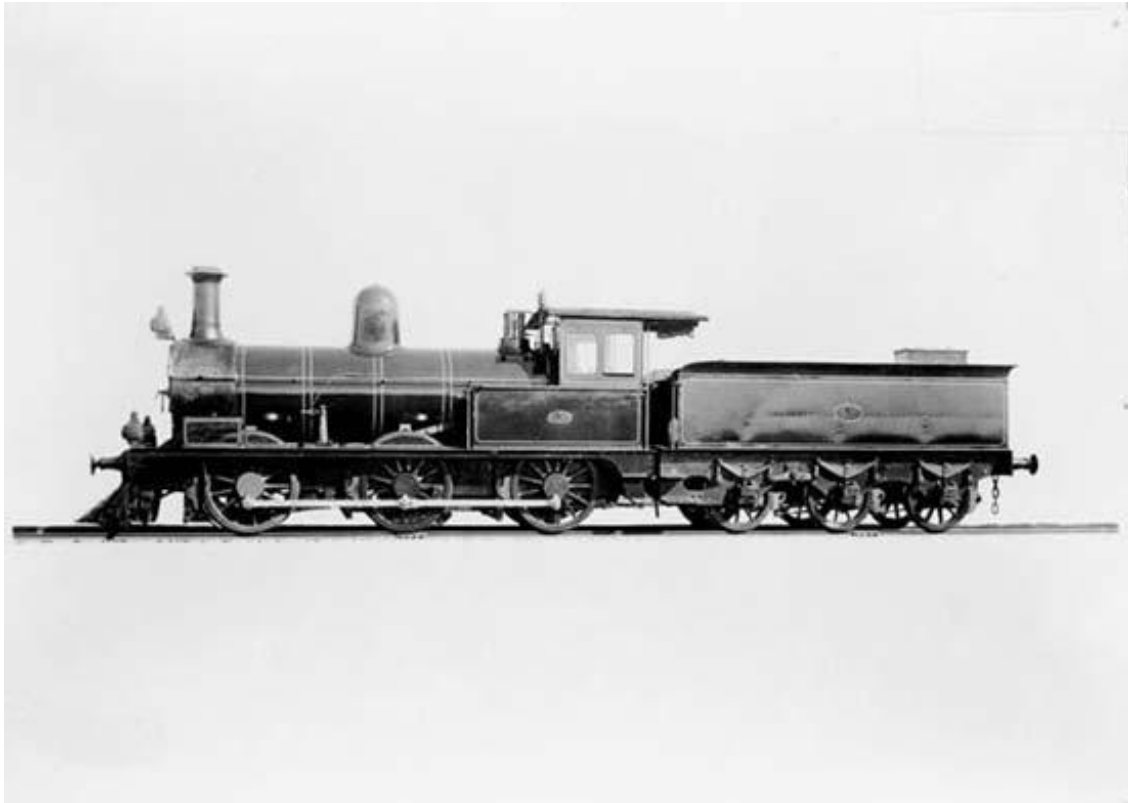
Image: www.australiansteam.com web site.

Phoenix locomotive T-94.
Now located at the Australian Railway Historical Museum at North Williamstown.

Image: www.australiansteam.com web site.

Phoenix locomotive Y-112.

Image: www.australiansteam.com web site.

Phoenix Y Class Locomotive. The road number is not visible in this image.

Image: Museum Victoria.12800-00001-000006-160

Phoenix Foundry locomotive Y-112, now operated by Steamrail, hauling a heritage train with a little help from a second engine at the rear.

Image: Corey Gibson Photography

Appendix 7:

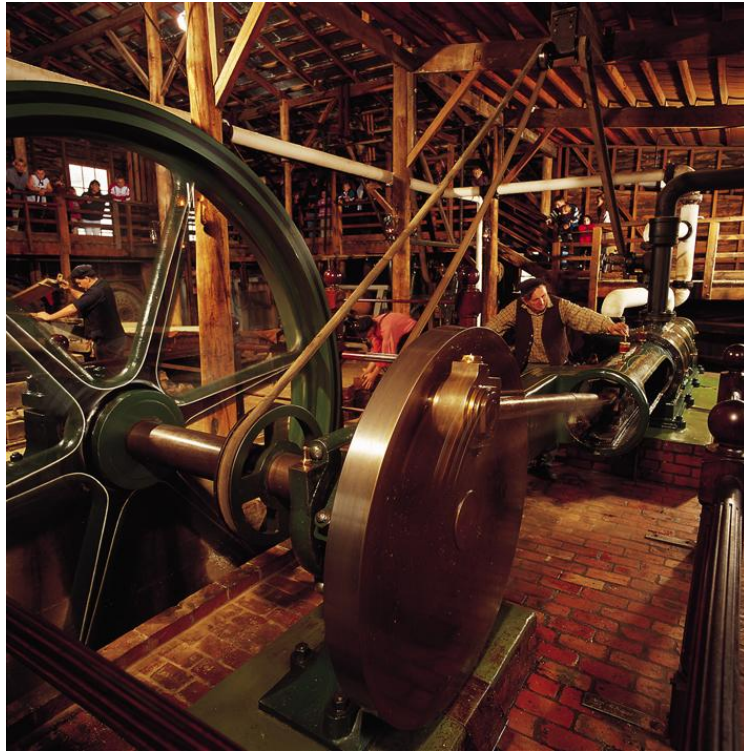## Remaining Products of the Phoenix Foundry - Stationary Steam Engines

Only one stationary steam engine manufactured by Phoenix Foundry is known to exist.[59] This engine is a horizontal tandem compound mill engine manufactured in circa 1888. This engine has had several homes but it now drives the gold stamping mill at Sovereign Hill, Ballarat. The engine operates most days under steam. The dimensions of this engine are listed in the table below:

Type: horizontal tandem compound
HP bore: 10 inches
LP bore: 16 inches
Cylinder configuration: HP outboard
Stroke: 36 inches
Indicated Horsepower: 80
 Valve-gear: D-slide valves both cylinders
Governor: Pickering type throttle governor
Flywheel diameter: approximately 10 feet
grooved for rope drive with 5 grooves
Frame configuration: bayonet with trunk
piston rod guide

This is beautiful engine, impeccably built to the highest standards and well maintained, is a fine example of a late 19th century mid-sized mill engine. Its current owners look after it with great pride. The engine is far from retirement and it drives the gold battery every day. Although quite a conventional design this engine indicates the high standards of the Phoenix Foundry.

An accurate 1:10 scale model of this engine was built by Owen Peake during the period 1990 to 2005. This model was subsequently burnt when the makers' home at Callignee in the Latrobe Valley was destroyed in the Black Saturday bushfires on 9 February 2009. The remains of the engine were recovered and are awaiting restoration. Some photographs of this engine are included to show aspects of the engine not available from images available online.

---

[59] Matthew Churchward, The Victorian Steam Heritage Register, Scienceworks, Museum of Victoria,1994, page 39
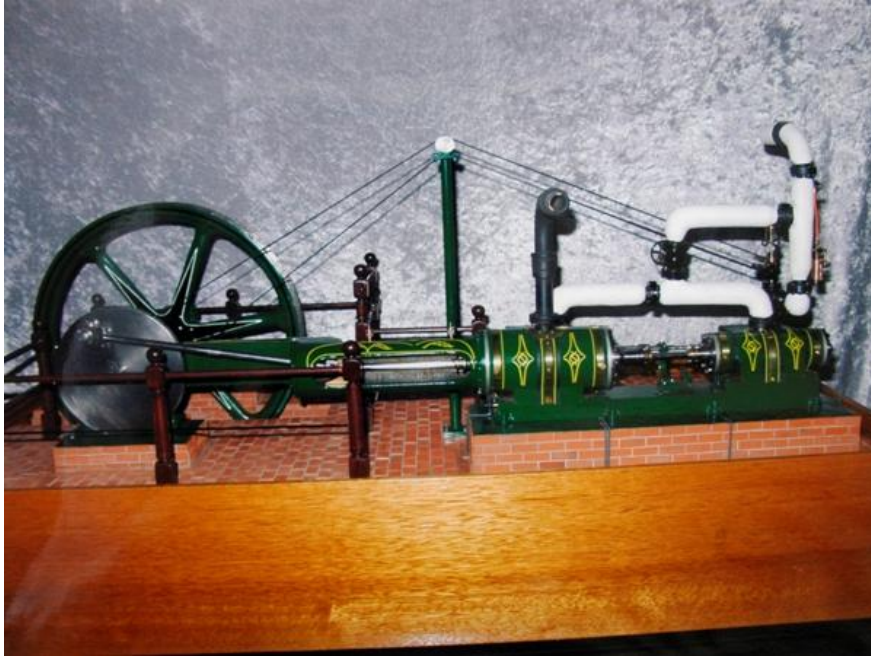
Phoenix Mill Engine at Sovereign Hill. This image shows the flywheel on the left, disc crank at centre and the trunk and cylinders in the background. Note that the engine is running.
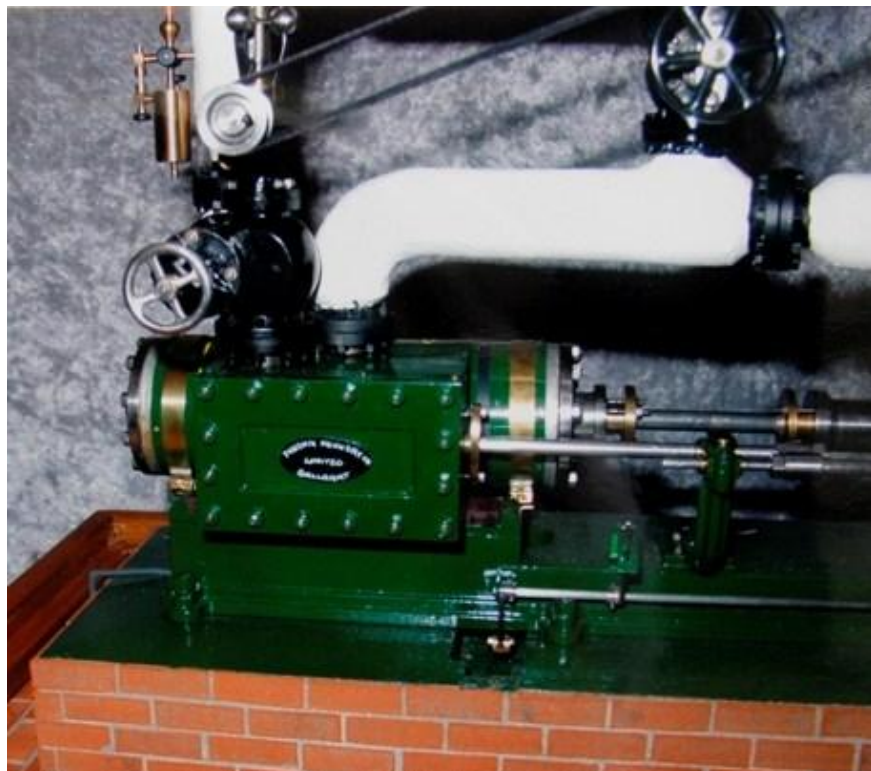
Image: Sovereign Hill Museums Association

Phoenix Mill Engine at Sovereign Hill. This image shows the flywheel in the centre with the trunk and disc crank to the left. And the outboard crankshaft bearing to the right. Note that ropes drive to a lay shaft in the background.

Image: Sovereign Hill Museums Association

**Model of the Phoenix at Sovereign Hill mill engine made by Owen Peake.
Side view of the engine showing cylinder configuration.**

Image: Owen Peake

**Model of the Phoenix at Sovereign Hill mill engine made by Owen Peake.
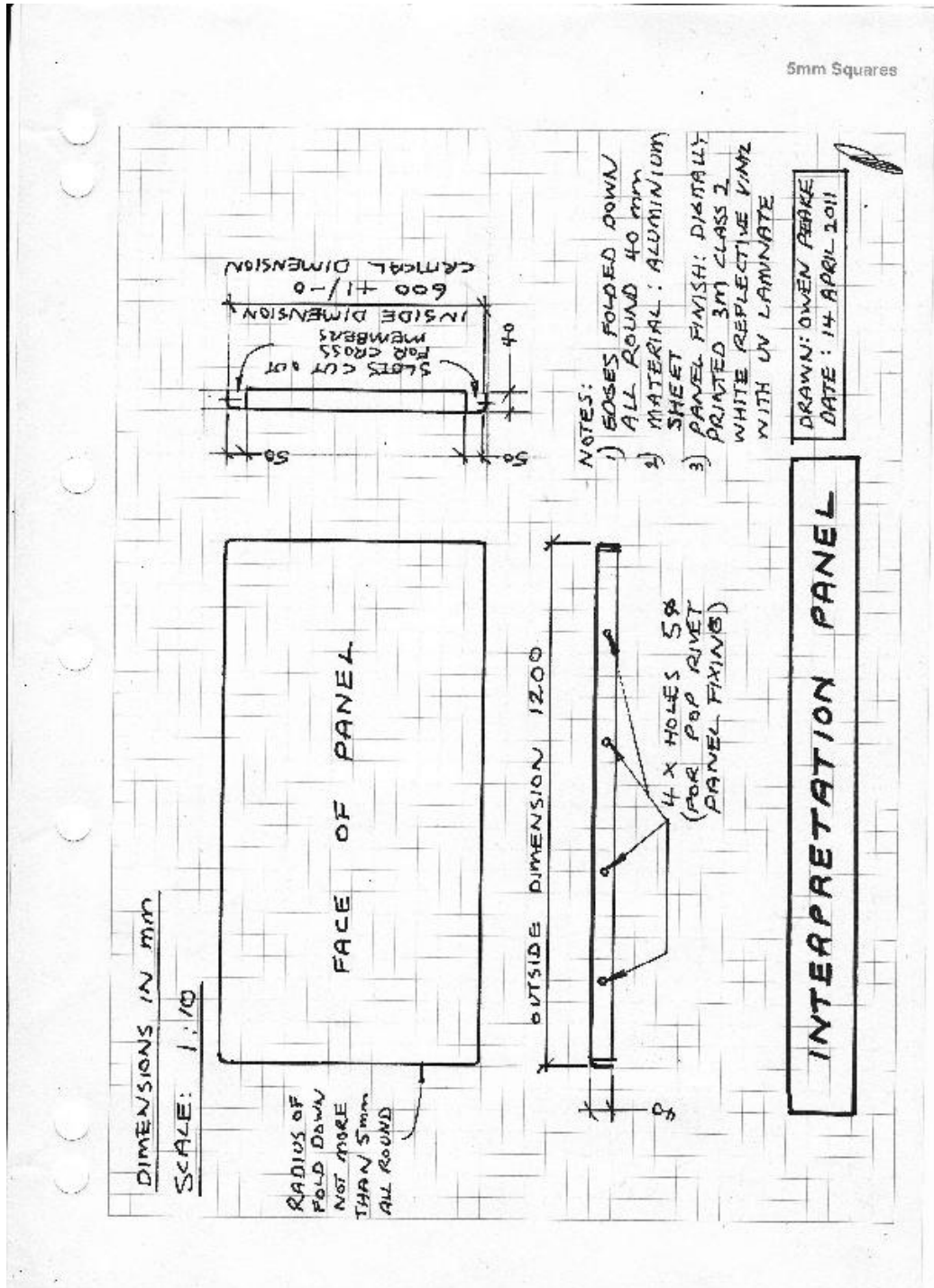High pressure steam chest cover showing Phoenix Foundry nameplate.**

Image: Owen Peake
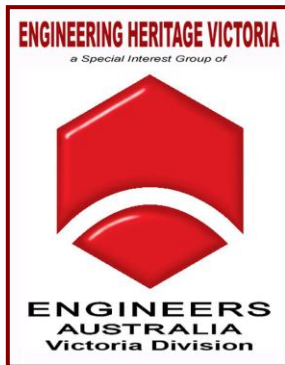
Appendix 8:

Timeline for Phoenix Foundry

1856   **Phoenix Foundry commences operation**

1870   **Phoenix Foundry becomes a limited liability company**

1871   **First order of locomotives for Victorian Railways**

1873   **First locomotive completed**

1877   **The Railway Inquiry Board investigates complaints about the quality of locomotives manufactured by Phoenix Foundry and largely decides in favour of Phoenix Foundry**

1883   **Phoenix Foundry celebrates the delivery of its 100th locomotive**

1886   **Phoenix Foundry has completed 203 locomotives**

1904   **Royal Commission into the cost of locomotives for the Victorian Railways finds that the Phoenix Foundry had engaged in "profiteering"**

1905   **Directors entered into voluntary liquidation**

1906   **Phoenix Foundry closed down**

Appendix 9: Interpretation Panel Drawings

Appendix 10:

Letters Relating to Owners Permission

ENGINEERING HERITAGE VICTORIA

A Special Interest Group of the Victorian Division of

Engineers Australia

Postal Address : Level 2, 21 Bedford Street
North Melbourne 3015

Email Address : ehv@engineersaustralia.org.au

Please respond direct to:
Owen Peake
4 Islington Street
Collingwood Vic 3066
Phone: (03) 9419 0820
Email: owen.peake@bigpond.com

20 August 2013

Mr Anthony Schinck
Chief Executive Officer
City of Ballarat
PO Box 655
BALLARAT VIC 3353

Dear Sir

Heritage Recognition Ceremony
Phoenix Foundry
October 2013

Engineers Australia is holding a major event in Ballarat on 12 and 13 October 2013. This annual event brings delegates from all the Victorian Regional Groups together and is always held in a regional city.

As a part of this event Engineering Heritage Victoria (EHV), as the group within Engineers Australia, Victoria Division responsible for heritage matters is planning a Heritage Recognition ceremony in Ballarat. The Heritage Recognition will be a part of Engineers

Australia's national Engineering Heritage Recognition Program which already recognises approaching 180 sites around the country.

The site we have selected is the Phoenix Foundry in Armstrong Street. Phoenix Foundry was a very large business in the early days of Ballarat and was, for many decades, the major manufacturer of railway locomotives for the Victorian Railways. Whilst the buildings of the foundry have long-since gone there is one relic of the foundry still in place in the form of a foundation for a railway turntable pivot in Armstrong Street. Our proposal is to tell the story of the Phoenix Foundry with an interpretation panel in the vicinity of the turntable pivot.

As the turntable pivot and the proposed interpretation panel is/will be located within a Council footpath we need your approval to proceed with the plan.

Some discussions have already taken place between your Heritage Advisor, Brian Benson and our Mike Caldwell.

Details of the Event

The event would take the form of a 30 minute ceremony on Saturday 12 October; probably at 2:00 pm. Speakers will include the National President of Engineers Australia, Dr Marlene Kanga and your Mayor if he accepts an invitation to speak.

The interpretation would be unveiled at the conclusion of the ceremony.

The interpretation panel would, in this case, incorporate the 300 mm diameter marker which forms part of the formal recognition.

Engineers Australia would arrange the event in close collaboration with the Council. Logistics for the event should be quite straightforward.

EHV would provide event organisation such as the sending out of invitations (including invitees on behalf of the Council); a handout document for attendees; Running Sheet for the event and inviting the press.

The Interpretation Panel

Engineers Australia uses a standard panel format 1200 mm wide by 600 mm high usually manufactured using the vitreous enamel-on-steel method.

It is proposed to locate the panel in the vicinity of the turntable pivot, either on the retaining wall or on a separate steel stand in the garden bed.

The panel has not yet been designed but we will consult with Council as the design progresses.

Please note that the Council plus Engineers Australia would have their logos included in the artwork of the interpretation panel and in printed material associated with the ceremony.

What we would need from Council

EHV would need your assistance in several areas to make this event happen:

- Your agreement for EHV to recognise the Phoenix Foundry and erect an interpretation panel at the site. A letter signifying Council approval is needed as a part of the nomination process. This letter is needed as a first step and is quite urgent.
- Your physical assistance, to install the panel would be appreciated. We could undertake this task but it is probably more appropriate for your people to do it as it is being fixed onto or into your property.
- Your physical assistance, to assist us with safety provision for the ceremony would also be appreciated. It is anticipated that the ceremony would be conducted on the footpath area which, in this location, is considerable below road level. Hence there is no prospect of conflict with road traffic.

A copy of an early draft of the nomination document is attached to the email forwarding this letter.

Our usual anticipation for attendance at events of this type is of the order of 50 to 80 attendees.

 Can you please advise if you support the above proposition?

Yours sincerely

OWEN PEAKE
Chair
Engineering Heritage Victoria

Copy:

Henk de Deugd, Chair, Engineers Australia, Ballarat Group
Mike Caldwell, Engineers Australia, Ballarat Group

CITY OF BALLARAT

City of Ballarat

PO Box 655
Ballarat Vic 3353
AUSTRALIA

Telephone   03 5320 5500
Facsimile   03 5333 4061

Date	10 September, 2013
Our Ref:	AS/gf
Your Ref	
Enquiries:	5320 5579

Owen Peake
Chair, Engineering Heritage Victoria
4 Islington Street
COLLINGWOOD   VIC   3006

Dear Mr Peake,

HERITAGE RECOGNITION CEREMONY, PHOENIX FOUNDRY

Thank you for your recent correspondence regarding the potential installation of an interpretive panel to be placed in the vicinity of the turntable pivot in the Phoenix Mall, the original site of the Phoenix Foundry.

With regard to the requests that you have made, please accept this letter as confirmation of the following:

- Council approves the installation of the interpretive panel as outlined.
- Council will provide the necessary physical assistance and labour for the installation of the interpretive panel
- Assistance with any necessary traffic management and additional safety requirements for the ceremony on Saturday, October 12, 2013.

For further assistance and a future contact on this project, please contact the City of Ballarat CBD Place Manager, Anthony Schreenan on telephone 5320 5579.

The City of Ballarat looks forward to celebrating this event with Engineering Heritage Victoria, and values your input for this event.

Yours sincerely

Anthony Schinck
Chief Executive Officer

come to life
BALLARAT

CHANGE CONTROL
VERSION 1	**25 JUNE 2013**	**2081 WORDS**	**COMMENCED DRAFTING**
VERSION 2	**29 JUNE 2013**	**2788 WORDS**	**FURTHER DRAFTING**
VERSION 3	**2 JULY 2013**	**2774 WORDS**	**ADDED APPENDIX 6**
VERSION 4	**12 AUG 2013**	**3355 WORDS**	**ADDED APPENDIX 4 - MODEL LOCOMOTIVE IN GOLD MUSEUM**
VERSION 5	**16 AUG 2013**	**7422 WORDS**	**ADDED MORE TEXT TO HISTORICAL NOTES & ASSOCIATIONS**
VERSION 6	**17 AUG 2013**	**8140 WORDS**	**ADDED APPENDICES 5 AND 6**
VERSION 7	**18 AUG 2013**	**8608 WORDS**	**ADDED APPENDIX 8 AND REFINEMENTS**
VERSION 8	**19 AUG 2013**	**8759 WORDS**	**ADDED IMAGES + REFINEMENTS**
VERSION 9	**20 AUG 2013**	**9326 WORDS**	**ADDED SECTION 7.5, TEXT BLOCKS**
VERSION 10	**21 AUG 2013**	**10090 WORDS**	**EDITING CHECK**
VERSION 11	**18 SEPT 2013**	**10635 WORDS**	**ADDED TEXT ARHS BOOK + BALLARAT COUNCIL RESPONSE**